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ملاحظة: يسمح باستعمال آلة حاسبة غير قابلة للبرمجة أو تخزين المعلومات أو رسم البيانات.
يستطيع المرشح الإجابة بالترتيب الذي يناسبه (دون الالتزام بترتيب المسائل الوارد في المسابقة)

I- (5 points)

A cosmetic company is launching two new products on the market: a perfume and a lotion for women.
The price of a bottle of perfume and a bottle of lotion is 100 000LL.
The company sells the product in boxes containing each a bottle of perfume and two bottles of lotion and offers 10% discount on the price of the perfume and 15% discount on that of the lotion.
The price of a box, after the discount, is equal to 122 000 LL.

1) a- Calculate the initial price of a bottle of perfume and that of a bottle of lotion.
   b- Calculate the price of each of the two bottles after the discount.

2) The company offers a supplementary discount of 5% on the price of the perfume and 8% on that of the lotion to the customers who buy a large quantity of boxes. Calculate the price of 50 boxes after the two discounts.

II- (5 points)

In a laboratory, a cage contains 20 guinea pigs distributed as shown in the following table:

Sex \ Color	White	Black
Male	7	6
Female	5	2

A-

An employee catches, randomly, one guinea pig from this cage.

1) Calculate the probability that the caught guinea pig is a black male.

2) The caught guinea pig is a male, what is the probability that it is black?

B-

In this part, the employee catches randomly two guinea pigs from this cage successively and without replacement.

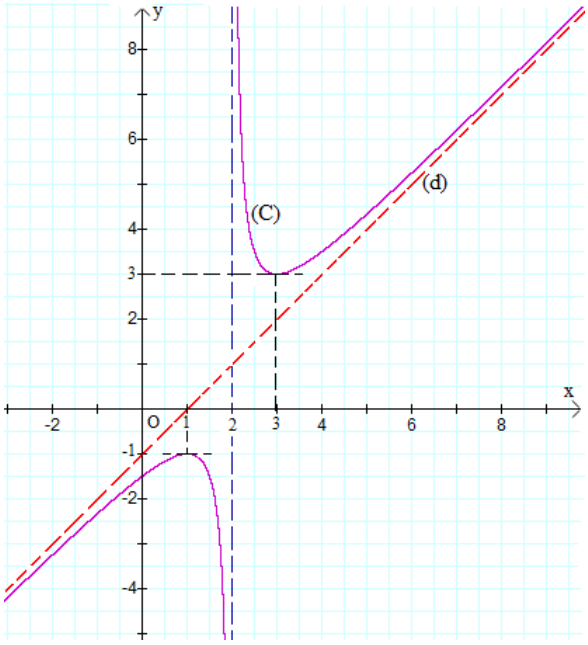
1) Show that the probability that the two caught guinea pigs are males is equal to $\frac{39}{95}$.

2) What is the probability that the two caught guinea pigs are two males of different colors?

III- (10 Points)

Consider the function f defined over $]-\infty;2[\cup]2;+\infty[$ as: $f(x)=ax+b+\dfrac{1}{x-2}$,

and let (C) be its representative curve in an orthonormal system.



A- Use the graph to answer the following questions.

1) Determine :
   a- $\lim\limits_{\substack{x\to 2\\ x<2}} f(x)$ and $\lim\limits_{\substack{x\to 2\\ x>2}} f(x)$.
   b- $\lim\limits_{x\to-\infty} f(x)$ and $\lim\limits_{x\to+\infty} f(x)$.

2) Compare f '(0) and f '(1).

3) Solve the inequality f(x) > 3.

4) Give the number of solutions of the equation f(x) = –3.

5) Determine an equation of the oblique asymptote (d), then deduce a and b.

6) Set up the table of variations of the function f .

B- Let $f(x)=x-1+\dfrac{1}{x-2}$.

1) Calculate f '(x).

2) Write an equation of the tangent to (C) at the point with abscissa x = 0.

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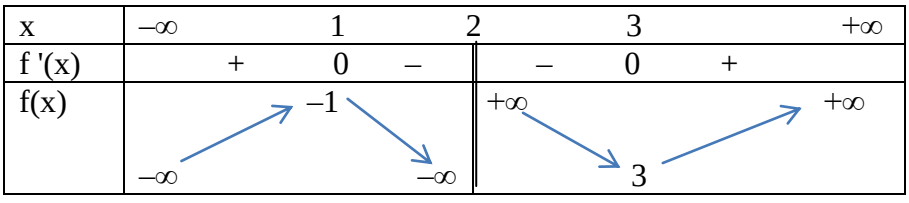
Q_1	Answers	G
1a	Let x be the price of the perfume and y that of the body lotion. $\begin{cases} x+y=100\,000 \\ 0.9x+2\times0.85y=122\,000 \end{cases}$ x= 60 000 and y = 40 000. The price of the perfume is 60 000LL and that of the lotion is 40 000LL.	2.5
1b	The price of the perfume becomes 0.9×60000 = 54000LL and the price of a lotion bottle is 40000×0.85=34000LL.	1
2	The price of the perfume after the two discounts 54000×0.95=51 300LL. The price of the lotion after the two discounts is 34000×0.92=31280LL. The price of 50 boxes after the two discounts is $50(51\,300+2\times31\,280)$=5 693 000LL.	1.5

Q_2	Answers	G
A1	$P(BM)=\frac{6}{20}=\frac{3}{10}.$	1
A2	$P(B/M)=\frac{6}{13}.$	1
B1	$P(MM)=\frac{13}{20}\times\frac{12}{19}=\frac{39}{95}.$	1
B2	$P(Mw,Mb)+P(Mb,Mw)=2\times\frac{6}{20}\times\frac{7}{19}=\frac{21}{95}.$	2

Q_3	Answers	G
A1a	$\lim\limits_{\substack{x\to2\\x<2}} f(x)=-\infty$; $\lim\limits_{\substack{x\to2\\x>2}} f(x)=+\infty.$	1
A1b	$\lim\limits_{x\to-\infty} f(x)=-\infty$; $\lim\limits_{x\to+\infty} f(x)=+\infty.$	1
A2	f ' (1) = 0 and f ′(0) > 0 then f '(0) > f '(1).	1
A3	f(x) > 3 for x > 2 and x ≠ 3.	1
A4	f(x)= –3 has two solutions since the line with equation y= –3 intersects (C) in two points.	1
A5	The equation of (d) is y= mx + n and (d) passes through the points (1 ; 0) and (0 ; –1) ,therefore n = –1 and m = 1 ; y = x – 1 ; but the equation of the oblique asymptote is + b hence a = 1 and b = –1.	1.5
A6		1.5
B1	$f'(x)=1-\frac{1}{(x-2)^2}.$	1
B2	y = f '(0) x +f(0)= $\frac{3}{4}x-\frac{3}{2}$	1